



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

May 13, 2011

Mr. Thomas D. Gatlin  
Vice President - Nuclear Operations  
South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station  
P.O. Box 88  
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR – NRC TEMPORARY INSTRUCTION 2515/183  
INSPECTION REPORT 05000395/2011009

Dear Mr. Gatlin:

On April 27, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Virgil C. Summer Nuclear Station, using Temporary Instruction 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event." The enclosed inspection report documents the inspection results which were discussed on May 4, 2011, with you and other members of your staff.

The objective of this inspection was to promptly assess the capabilities of Virgil C. Summer Nuclear Station to respond to extraordinary consequences similar to those that have recently occurred at the Japanese Fukushima Daiichi Nuclear Station. The results from this inspection, along with the results from this inspection performed at other operating commercial nuclear plants in the United States, will be used to evaluate the U.S. nuclear industry's readiness to safely respond to similar events. These results will also help the NRC to determine if additional regulatory actions are warranted.

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report. You are not required to respond to this letter.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of

NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Gerald J. McCoy, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Docket No.: 50-395  
License No.: NPF-12

Enclosure: NRC TEMPORARY INSTRUCTION  
2515/183 INSPECTION REPORT 05000395/2011009  
w/ Attachment: Supplemental Information

cc w/encl: (See page 3)

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Sincerely,

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Letter to Thomas D. Gatlin from Gerald J. McCoy dated May 13, 2011

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INTEGRATED INSPECTION  
REPORT 05000395/2011009

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-395

License No.: NPF-12

Report No.: 05000395/2011009

Licensee: South Carolina Electric & Gas (SCE&G) Company

Facility: Virgil C. Summer Nuclear Station

Location: P.O. Box 88  
Jenkinsville, SC 29065

Dates: March 31, 2011 through April 27, 2011

Inspectors: J. Zeiler, Senior Resident Inspector  
E. Coffman, Resident Inspector

Approved by: Gerald J. McCoy, Chief  
Reactor Projects Branch 5  
Division of Reactor Project

Enclosure

## **SUMMARY OF FINDINGS**

IR 05000395/2011009, 03/31/2011 – 04/27/2011; Virgil C. Summer Nuclear Station; Temporary Instruction 2515/183 – Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event

This report covers an announced Temporary Instruction inspection. The inspection was conducted by resident inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006."

## **INSPECTION SCOPE**

The intent of the TI is to provide a broad overview of the industry's preparedness for events that may exceed the current design basis for a plant. The focus of the TI was on (1) assessing the licensee's capability to mitigate consequences from large fires or explosions on site, (2) assessing the licensee's capability to mitigate station blackout (SBO) conditions, (3) assessing the licensee's capability to mitigate internal and external flooding events accounted for by the station's design, and (4) assessing the thoroughness of the licensee's walk downs and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. If necessary, a more specific follow-up inspection will be performed at a later date.

## **INSPECTION RESULTS**

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report.

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03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events, typically bounded by security threats, committed to as part of NRC Security Order Section B.5.b issued February 25, 2002, and severe accident management guidelines and as required by Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh). Use Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," Section 02.03 and 03.03 as a guideline. If IP 71111.05T was recently performed at the facility the inspector should review the inspection results and findings to identify any other potential areas of inspection. Particular emphasis should be placed on strategies related to the spent fuel pool. The inspection should include, but not be limited to, an assessment of any licensee actions to:

Licensee Action	Describe what the licensee did to test or inspect equipment.
<p>a. Verify through test or inspection that equipment is available and functional. Active equipment shall be tested and passive equipment shall be walked down and inspected. It is not expected that permanently installed equipment that is tested under an existing regulatory testing program be retested.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>The licensee performed an inventory of B.5.b equipment referenced in attachments to Operations Administrative Procedure, OAP-100.6, "Control Room Conduct and Control of Shift Activities," Revision 2C. In addition, the licensee also reviewed all scheduled preventive maintenance tasks for B.5.b equipment.</p>
	<p>The licensee also performed equipment starts to re-verify that active equipment started and functioned properly and that passive equipment was staged, available, and appropriate for completing the subject strategies. These equipment starts included starting of the: portable air compressor, portable diesel generator, fire pumper truck (including operation of the pump) and portable submersible pump.</p>
	<p>Describe inspector actions taken to confirm equipment readiness (e.g., observed a test, reviewed test results, discussed actions, reviewed records, etc.).</p>
	<p>The inspectors reviewed the licensee's records as documented in CR-11-01207, "IER L1 11-1 Fukushima Daiichi Nuclear Station Fuel Damage Caused By Earthquake and Tsunami." The inspectors also performed a risk-informed sample consisting of several B.5.b equipment walkdowns. Further, inspectors interviewed the licensee's lead for inspection of the B.5.b equipment and also observed testing of the pumper truck.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The most notable corrective action taken by the licensee was that they discovered the B.5.b</p>

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	<p>portable submersible pump did not have a camloc fitting used to mate the discharge hoses with the pump. According to the licensee, it appears that the fitting was never installed and an alternate means was not staged with the B.5.b equipment; however, the licensee interviewed two mechanical maintenance supervisors and determined that mechanics could attach the discharge hose with a hose clamp and pipe section that is readily available on site. The licensee immediately ordered the correct fitting and, upon receipt, installed the camloc fitting along with an elbow to allow hose connection to the discharge side of the pump. The inspectors have verified that the discharge fitting will now correctly mate to the discharge hoses. This issue is entered into the licensee's corrective action database as action 18 of CR-11-01207.</p> <p>Other licensee actions included updating OAP-100.6 to include additional equipment that has been added to B.5.b inventories and evaluating the need for periodic testing to perform: a functional load test of the B.5.b portable diesel generator (a periodic start is currently performed, but no load test is performed), testing of the distribution panel, testing of the battery charger, discharge testing of the fire pumper truck (the pump mounted on the truck is periodically started, but no discharge testing is performed), testing of the submersible pump and testing of the small portable generators. The need for some additional preventive maintenance items is also being evaluated by the licensee for several of the items above. Corrective actions to evaluate the need for the periodic tests above are documented in CR-11-01207: actions 15, 16 and 17.</p>
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Licensee Action	Describe the licensee's actions to verify that procedures are in place and can be executed (e.g. walkdowns, demonstrations, tests, etc.)
b. Verify through walkdowns or demonstration that procedures to implement the strategies associated with B.5.b and 10 CFR 50.54(hh) are in place and are executable. Licensees may choose not to connect or operate permanently installed equipment during this verification.	The licensee's operations and maintenance personnel performed procedure walkdowns associated with: beyond design basis events using Beyond Design Basis Mitigating Guidelines (BDMGs); loss of all Engineered Safety Feature (ESF) power using Emergency Operating Procedure EOP-6.0, "Loss of All ESF AC Power," Revision 22; and spent fuel level and cooling using Abnormal Operating Procedures (AOPs) from the AOP-123 procedure series. The licensee also verified that equipment referenced in the "Severe Accident Management Guideline (SAMG) Scope, Training, User's Guide and Guidelines," Revision 0D was functional. The licensee completed additional checks to give assurance that the intended function as referenced in the SAMG was met. The licensee's walkdowns determined that the strategies from these procedures could be executed as written.

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<p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>Describe inspector actions and the sample strategies reviewed. Assess whether procedures were in place and could be used as intended.</p>
	<p>The inspectors walked down portions of BDMG-2.0, "RWST Makeup," Revision 1A and portions of BDMG-1.0, "Spent Fuel Pool Makeup and Spray Strategies," Revision 1A to ensure equipment was properly staged and that the contingency seemed feasible.</p> <p>The inspectors also reviewed documentation from the licensee's review (found in CR-11-01207) and interviewed the licensee's lead reviewer about a few of the minor procedure enhancements noted in the CR.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>During walkdowns, the inspectors identified that contingency actions from BDMG-2.0, "RWST Makeup," Revision 1A, to create a borated water source using offsite materials were not detailed in nature. Specifically, the procedure lacked instructions on how to recirculate water using the fire truck to mix in boric acid and did not explain how to procure additional offsite equipment needed such as a swimming pool, septic tank or fabric tank. Further, Plant Support Engineer Guide (PSEG) 8.0, "Technical Support Center Duties," Revision 12, did not contain any further information on the contingency actions, even though a note above the contingency actions in BDMG-2.0 recommended consultation with the Technical Support Center (TSC). The licensee has entered the issue into their corrective action program as action 23 of CR-11-01207 and plans to evaluate updating PSEG-8.0.</p> <p>During procedure walkdowns, the licensee determined they needed to evaluate gagging the Feedwater Isolation Valves (FIVs) in BDMG-5.0, "Manually Depressurize SGS and Use Low Pressure Water Sources (Turbine Driven Emergency Feedwater Pump Not Available)," Revision 1A, since there is operating experience that discusses the potential for the FIVs to drift close during certain types of scenarios. The licensee performed an evaluation and determined that since the accumulators holding the FIVs open contain a limited amount of air, the FIVs could have some potential to drift close during evolutions found in BDMG-5.0. As an enhancement, the licensee manufactured gagging devices to hold the FIVs open during these evolutions and submitted a procedure feedback form to update BDMG-5.0. Since the action from the procedure feedback form has not yet been completed, the inspectors consider this item to be open until BDMG-5.0 is updated. The licensee has</p>

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	<p>entered the issue into their corrective action program as action 22 of CR-11-01207.</p> <p>The licensee also identified several minor enhancements to equipment access and staging during the procedure walkdowns. Some of these minor enhancements included: the addition of door chocks and a cart to aid in running fire hoses; locating hose and spanner wrenches closer to certain valves; providing ladders to access certain valves; and adding procedure notes to obtain necessary keys from security. The licensee has added an action item in their corrective action program to evaluate these enhancements to additional equipment staging; this action item is documented under action 20 of CR-11-01207.</p>
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Licensee Action	Describe the licensee's actions and conclusions regarding training and qualifications of operators and support staff.
c. Verify the training and qualifications of operators and the support staff needed to implement the procedures and work instructions are current for activities related to Security Order Section B.5.b and severe accident management guidelines as required by 10 CFR 50.54 (hh).	The licensee reviewed qualifications of plant personnel required to maintain and implement B.5.b equipment strategies and to implement Severe Accident Management Guidelines. The licensee determined that station personnel possess the necessary knowledge and skills to maintain and implement B.5.b equipment and to implement Severe Accident Management Guidelines if necessary.
	Describe inspector actions and the sample strategies reviewed to assess training and qualifications of operators and support staff
	The inspectors reviewed qualification reports for BDMG and SAMG courses for operations staff; qualification reports for B.5.b support training for mechanical maintenance personnel; qualification reports for B.5.b support training for instrument and controls personnel; and qualification reports for B.5.b support training for electrical maintenance personnel.
	Discuss general results including corrective actions by licensee.
	No issues were identified.

Licensee Action	Describe the licensee's actions and conclusions regarding applicable agreements and contracts are in place.
<p>d. Verify that any applicable agreements and contracts are in place and are capable of meeting the conditions needed to mitigate the consequences of these events.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>The licensee determined that applicable agreements and contracts are in place and capable of meeting the conditions needed to mitigate the consequences of beyond design basis events. These agreements are listed in Emergency Plan EP-100, "Radiation Emergency Plan," Revision 58, Appendix C. All documents referenced in EP-100 were verified to be current.</p> <p>In addition, "V.C. Summer Nuclear Station Emergency Planning Telephone Directory," Revision 103, includes contacts for specialized services that could be considered should an event require the associated service.</p>
	<p>For a sample of mitigating strategies involving contracts or agreements with offsite entities, describe inspector actions to confirm agreements and contracts are in place and current (e.g., confirm that offsite fire assistance agreement is in place and current).</p>
	<p>The inspectors reviewed a sample of mitigating strategies involving contracts or agreements with offsite entities; specifically agreements with these were entities sampled: Newberry County, Lexington County, Richland County, Columbia Metropolitan Airport – Fire and Rescue and Jenkinsville-Monticello-Horeb Volunteer Fire Department. These agreements were found to be current.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>No issues were identified.</p>

Licensee Action	Document the corrective action report number and briefly summarize problems noted by the licensee that have significant potential to prevent the success of any existing mitigating strategy.
<p>e. Review any open corrective action documents to assess problems with mitigating strategy implementation identified by the licensee. Assess the impact of the problem on the mitigating capability and the remaining capability that is not impacted.</p>	<p>The licensee recorded both their corrective actions and results from the walkdowns in CR-11-01207, "IER L1 11-1 Fukushima Daiichi Nuclear Station Fuel Damage Caused By Earthquake and Tsunami."</p> <p>The licensee identified that the B.5.b submersible pump did not have a camloc fitting used to mate the discharge hoses to the pump. However, the licensee determined that mechanics could attach the discharge hose with a hose clamp and pipe section that is also on site. The fitting has since been installed. Section 3.01(a) of this report contains more details. This issue is entered into the licensee's corrective action database as action 18 of CR-11-01207.</p> <p>The licensee performed an evaluation and determined that since the accumulators holding the FIVs open contain a limited amount of air, the FIVs could possibly have some potential to drift close during evolutions found in BDMG-5.0. As an enhancement, the licensee manufactured gagging devices to hold the FIVs open and submitted a procedure feedback form to update BDMG-5.0. Section 3.01(b) of this report contains more details. This issue is entered into the licensee's corrective action database as action 22 of CR-11-01207.</p> <p>The licensee is in the process of evaluating the potential need for periodic testing to perform: a functional load test of the B.5.b portable diesel generator, testing of the B.5.b distribution panel, testing of the B.5.b battery charger, discharge testing of the B.5.b fire pumper truck, testing of the B.5.b submersible pump and testing of the small B.5.b portable generators. Section 3.01(a) of this report contains more details. Actions 15, 16 and 17 of CR-11-01207 are to evaluate the need for these periodic tests.</p>

03.02 Assess the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63, "Loss of All Alternating Current Power," and station design, is functional and valid. Refer to TI 2515/120, "Inspection of Implementation of Station Blackout Rule Multi-Plant Action Item A-22" as a guideline. It is not intended that TI 2515/120 be completely reinspected. The inspection should include, but not be limited to, an assessment of any licensee actions to:	
Licensee Action	Describe the licensee's actions to verify the adequacy of equipment needed to mitigate an SBO event.
a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.	<p>The licensee walked-down the following procedures and verified that the associated materials were properly staged and adequate:</p> <ul style="list-style-type: none"> <li>• EOP-6.0, "Loss of All ESF AC Power," Revision 22; EOP-6.1, "Loss of All ESF AC Power Recovery Without SI Required," Revision 14; and EOP-6.2, "Loss of All ESF AC Power Recovery With SI Required," Revision 12</li> <li>• Sections V.A,V.B,V.C and V.D of System Operating Procedure (SOP) 304, "115kV/7.2kV Operations," Revision 12E, that detail response to off normal conditions</li> <li>• AOP-304.1, "Loss of Bus 1DA(1DB) With the Diesel not Available," Revision 3G</li> </ul>
	Describe inspector actions to verify equipment is available and useable.
	<p>The inspectors reviewed the licensee's documentation from the walkdown as found in CR-11-01207. The inspectors also performed a risk-informed sample consisting of walkdowns for the following Electrical Maintenance Procedures (EMP): EMP-100.002, "Emergency Installation of Cables For RHR System," Revision 6A; EMP-100.004, "Installation of Temporary Alternate Feed Cable For Spent Fuel Pumps," Revision 5A; and EMP-100.006, "Emergency Installation of Cables For SI Valves," Revision 3A. All of these EMP's were referenced from EOP-6 series procedures, with the exception of EMP-100.002.</p>
	Discuss general results including corrective actions by licensee.
	<p>The inspectors identified that the licensee failed to review some portion of PSEG-08, "Technical Support Center Duties," Revision 12. PSEG-08 is used for Technical Support Center (TSC) duties and is relevant to the walk downs. Specifically, procedure EMP-100.002, "Emergency Installation of Cable for the RHR System" referenced in PSEG-08 was not reviewed and the associated items were not inventoried as part of the walkdown.</p>

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	The inspectors verified that all materials used in EMP-100.002 were present. The licensee has since completed a walkdown and review of EMP-100.002. This issue is documented in CR-11-01599, "NRC resident identified issues during NRC verification of CR-11-01207."
Licensee Action	Describe the licensee's actions to verify the capability to mitigate an SBO event.
b. Demonstrate through walkdowns that procedures for response to an SBO are executable.	<p>The licensee walked-down the following procedures to verify that the procedures were executable:</p> <ol style="list-style-type: none"> <li>1. EOP-6.0, "Loss of All ESF AC Power," Revision 22; EOP-6.1, "Loss of All ESF AC Power Recovery Without SI Required," Revision 14; and EOP-6.2, "Loss of All ESF AC Power Recovery With SI Required," Revision 12</li> <li>2. Sections V.A,V.B,V.C and V.D of SOP-304, "115kV/7.2kV Operations," Revision 12E that detail response to off normal conditions</li> <li>3. AOP-304.1, "Loss of Bus 1DA(1DB) With the Diesel not Available," Revision 3G</li> </ol>
	Describe inspector actions to assess whether procedures were in place and could be used as intended.
	The inspectors reviewed the licensee's documentation from the walkdown as found in CR-11-01207. The inspectors also performed a risk-informed sample consisting of walkdowns for the following electrical maintenance procedures: EMP-100.002, "Emergency Installation of Cables For RHR System," Revision 6A; EMP-100.004, "Installation of Temporary Alternate Feed Cable for Spent Fuel Pumps," Revision 5A; and EMP-100.006, "Emergency Installation of Cables For SI Valves," Revision 3A.
	Discuss general results including corrective actions by licensee.
	During the walkdowns, inspectors identified that the licensee failed to correctly follow EMP-100.004 which is referenced in EOP-6.0. Per EMP-100.004, the licensee had staged the power cables as part of the upcoming outage, but failed to stage the EMP-100.004 tool bag in the hot machine room as required in the procedure. Instead, the tool bag was found in a storage locker in the electrical maintenance shop. Had electricians needed to hook up the cable, it is unclear whether or not they would have known where the tool bag was. The

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	inspectors assessed this to be minor since the tools found in the tool bag are readily available electrician's tools. Further, having the cable already laid out saves a lot of time as the licensee would otherwise need to use a fork lift, cable reel and reel jacks to place the cable. The licensee has entered this item into their corrective action database as part of CR-11-01599, "NRC resident identified issues during NRC verification of CR-11-01207." Additionally, action 24 of CR-11-01207 is a completed action to modify EMP-100.004 and add additional clarification to other EMP procedures.
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03.03 Assess the licensee's capability to mitigate internal and external flooding events required by station design. Refer to IP 71111.01, "Adverse Weather Protection," Section 02.04, "Evaluate Readiness to Cope with External Flooding" as a guideline. The inspection should include, but not be limited to, an assessment of any licensee actions to verify through walkdowns and inspections that all required materials and equipment are adequate and properly staged. These walkdowns and inspections shall include verification that accessible doors, barriers, and penetration seals are functional.	
Licensee Action	Describe the licensee's actions to verify the capability to mitigate existing design basis flooding events.
a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.	<p>For external flooding, the licensee: identified the design basis flooding level, determined the barriers important to resisting the effects of external flooding, determined the critical structures potentially affected by external floods and determined flood relief paths credited in the current design. This included walkdowns of the following external flood prevention features: the north berm, the service water pond and associated dams, and level instrumentation on Lake Monticello.</p> <p>For internal flooding, the licensee: identified the design basis flood level as documented in the current licensing basis, determined for each accessible floor elevation the floor and walls required to function as flood barriers, determined the level of flooding at each accessible floor, reviewed plant flooding response procedures and identified the adequacy of and proper staging of any equipment credited for flood mitigation.</p> <p>Once internal flooding barriers and equipment were identified, the licensee verified through walkdowns and inspections: that all required materials and equipment are adequate and properly staged and that accessible doors, barriers, and penetration seals were functional.</p>



	<p>Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.</p> <p>For external flooding, the inspectors assessed the licensee's capabilities to mitigate flooding by conducting a review of the licensee's walkdown activities. Specifically, inspectors accompanied the licensee on walkdowns of the north berm. Additionally, on April 7, 2011, the inspectors accompanied the Federal Energy Regulatory Commission (FERC) for the two year inspection of the service water pond dams and the west embankment. The function of the service water pond dams is to allow safe shutdown of the plant using only the service water pond, without any reliance upon the Monticello Reservoir. The west embankment and three earth dams of the service water pond are Seismic Category 1 structures, requiring protection against wind setup and wave run-up through the use of riprap along the slope of the dams and embankment. During the walkdown, the inspectors also assessed the condition of this riprap.</p> <p>For internal flooding, the inspectors interviewed the lead engineer for the internal flooding walk downs. Inspectors also reviewed the licensee's documentation as recorded in CR-11-01207, performed a walkdown of the Service Water Pump House as a risk informed sample, and reviewed several flooding calculations.</p> <p>Discuss general results including corrective actions by licensee.</p> <p>The licensee documented their results in a table attached to CR-11-01207. The table identified eight issues pertaining to internal flooding barriers. Five of the eight issues dealt with doors. The table states the following for each of these doors: "not a water tight door," but that "limited leakage through this last door is acceptable." These particular doors are located in the intermediate building and the auxiliary building. The table did not have enough information to support or disprove the licensee's statement. More importantly, the licensee had not documented whether or not the doors were part of their flood protection licensing basis requirements. When the inspectors questioned the licensee regarding these details, it was found that no formal analysis had been completed.</p> <p>The licensee has since written CR-11-02380, "Propagation of internal flooding through certain blast doors has not been postulated or evaluated in the internal flooding calculations" to evaluate this issue. In CR-11-02380, the licensee states that the internal</p>
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	<p>flooded calculations have an unstated assumption that these blast doors are water tight. CR-11-02380 states that the leakage will not submerge any safety related equipment; however, the licensee's evaluation is not complete. At this time, without knowing the results of the licensee's evaluation and its impact on the internal flooding calculations and plant licensing basis requirements, it is not possible for inspectors to complete review of this issue.</p>
<p>03.04 Assess the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. Assess the licensee's development of any new mitigating strategies for identified vulnerabilities (e.g., entered it in to the corrective action program and any immediate actions taken). As a minimum, the licensee should have performed walkdowns and inspections of important equipment (permanent and temporary) such as storage tanks, plant water intake structures, and fire and flood response equipment; and developed mitigating strategies to cope with the loss of that important function. Use IP 71111.21, "Component Design Basis Inspection," Appendix 3, "Component Walkdown Considerations," as a guideline to assess the thoroughness of the licensee's walkdowns and inspections.</p>	
Licensee Action	Describe the licensee's actions to assess the potential impact of seismic events on the availability of equipment used in fire and flooding mitigation strategies.
<p>a. Verify through walkdowns that all required materials are adequate and properly staged, tested, and maintained.</p>	<p><u>Licensee Fire Response Actions:</u> The licensee developed an engineering plan that included a walkdown and inspection of all accessible fire areas of the plant that contained either permanent or temporary fire equipment used in the site fire emergency response procedures. This plan also included walkdown and inspection of lower importance locations in the plant that were not part of the fire emergency response procedures, but contained fire service (i.e, detection, suppression, etc.) equipment. For each area included in the walkdown and inspections, licensee engineering personnel identified the following:</p> <ul style="list-style-type: none"> <li>• whether each specific fire area contained permanent or portable fire equipment,</li> <li>• whether the fire equipment was seismically qualified or not,</li> <li>• whether any vulnerability was identified during the walkdown,</li> <li>• the type of vulnerability, i.e., whether the vulnerability was an existing degraded condition, was a "survivability improvement" item, was a procedure weakness issue, or whether the fire equipment was inaccessible at the time of the inspection, and</li> <li>• whether any mitigating strategy was required for the vulnerability identified.</li> </ul> <p><u>Licensee Flood Walkdowns and Inspections:</u> The licensee developed an inspection plan</p>

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	<p>that included each accessible plant floor elevation and key outdoor areas including roof tops, the north berm, the service water pond and associated dams and Lake Monticello level instrumentation. During the walkdowns, the licensee determined whether vulnerabilities existed and whether a mitigation strategy was required for any identified vulnerabilities. The results were provided as an attachment to CR-11-01207 in a table.</p>
	<p>Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.</p>
	<p><u>Inspector Action to Verify Fire Equipment is Available:</u> The inspectors conducted multiple walkdowns of important fire system equipment needed to mitigate a fire to identify any material deficiency in the equipment's ability to perform its function and to assess how the equipment function might be impacted during a seismic event. This equipment included the following:</p> <ul style="list-style-type: none"> <li>• the fire protection water supply system including the electric and diesel driven fire pumps and associated control system,</li> <li>• the non-FSAR credited "alternate" fire protection electric and diesel driven fire pumps and associated control system, which take suction from the filtered water system tank,</li> <li>• the fire detection and alarm information panels located in the control room and Technical Support Center,</li> <li>• all installed fire protection and suppression equipment in the Fuel Handling Building, and,</li> <li>• all B.5.b contingency response equipment located in the Fuel Handling Building, and selected B.5.b contingency response equipment located in the Control Building, Auxiliary Building, Intermediate Building, and Turbine Building.</li> </ul> <p>The inspectors performed a general review of all the licensee's fire emergency procedures (FEPs) to verify usability. The inspectors performed a more detailed review of FEP-4.0, "Control Room Evacuation Due to Fire," Revision 4E, dated August 25, 2010, due to its high safety importance and more complicated coordination of actions necessary for reliable implementation.</p> <p>While no major concerns were identified by the inspectors during the above reviews, several minor issues were identified during verification of staged tools/equipment necessary for</p>

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	<p>implementation of FEP-4.0. Specifically, the inspectors identified that several electrical ampere meters were missing from the tool kits staged in Control Room Evacuation Panel location and several flashlights were found with dead batteries. The licensee initiated immediate corrective actions to replace the electrical meters and replaced all the batteries in the flashlights located in response kits located in the plant. This issue was addressed in the licensee's corrective program as CR-11-01604. This issue was considered minor by the inspectors since backup electrical ampere meters and additional working flashlights were available or nearby the associated locations.</p> <p><u>Inspector Action to Verify Flood Equipment is Available:</u> For internal and external flooding, the inspectors assessed the licensee's capabilities to mitigate flooding by conducting a review of the licensee's walkdown activities to identify potential equipment loss during a seismic event. Inspectors also accompanied the licensee on walkdowns of the north berm. Additionally, inspectors accompanied the Federal Energy Regulatory Commission for the two year inspection of the service water pond dams as part of an independent sample. Inspectors also performed a walkdown of the Service Water Pump House as a risk informed sample and reviewed several flooding calculations.</p> <p>Discuss general results including corrective actions by licensee. Briefly summarize any new mitigating strategies identified by the licensee as a result of their reviews.</p> <p><u>General Results for Fire:</u> The licensee documented the results of their fire protection system readiness assessments in a table attached to CR-11-01207. The licensee identified and documented issues and vulnerabilities from their assessment based on the classification scheme previously discussed in Section 03.04.a (i.e., whether the vulnerability issue was considered a degradation, improvement item, procedure enhancement, or whether the item was currently inaccessible to assess). The results of the licensee's assessment determined that, generally, none of the permanently installed fire protection equipment was seismically qualified (i.e., designed to function following a design basis earthquake event) and some of the firefighting equipment staged to respond to B.5.b events was not stored in seismically qualified buildings and locations (e.g., in the Turbine Building, Demineralized Water Pump House, Filtered Water Pump House, Circulating Water Intake Building, Service Building, and Respirator Building, as well as in various non-seismic qualified Warehouses). The inspectors noted that the plant fire protection design bases (as described in FSAR Section 9.5.1.1) states that the plant fire protection system is classified as non-nuclear safety class, except for containment isolation provisions which are safety</p>
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	<p>class 2a. The licensee determined that while all plant fire system piping is not seismically qualified, fire system piping above safe shutdown equipment is designed to anti-fall down provisions, i.e., designed in such a manner to prevent non-seismic fire piping from falling and doing damage to essential equipment necessary for safe shutdown. Licensee walkdown assessments of the fire system piping anti-fall down support structures did not identify any significant deficiencies, however, numerous minor material condition issues (e.g., loose or bent supports) were identified. The inspectors verified that these issues were captured in the licensee corrective action program for subsequent review and corrective maintenance. Based on the licensee's fire system readiness assessments, the licensee did not identify any significant vulnerability issue that required the development of an immediate mitigation strategy. However, the licensee stated that each identified vulnerability would subsequently be reviewed in more detail, risk ranked, and a determination made if a future mitigation strategy was desired.</p> <p><u>General Results for Flooding:</u> For external flooding, the licensee identified three vulnerabilities due to equipment not being seismically qualified. The most significant item found was that the north berm is not seismically qualified. The purpose of the north berm is to provide site shoreline protection against all of the following happening at the same time: wave run-up, wave setup due to a 50 mph wind and a maximum flood elevation of the Monticello Reservoir resulting from probable maximum precipitation (PMP). In an attachment to CR-11-01207, the licensee states that without the north berm, the site elevation is sufficient to prevent flooding from a seismic induced wave action (e.g. seiching). Inspectors reviewed relevant portions of the licensee's Updated Final Safety Analysis Report (UFSAR), Chapter 2.0 "Site Characteristics" and could not find any information to disagree with the licensee's conclusions. Since the licensee believes site elevation is sufficient, they developed no mitigation strategy for loss of the north berm.</p> <p>For internal flooding, the licensee identified that six level switches in the turbine building were not seismically qualified. At VC Summer, if a circulating water pipe failure were to occur in the turbine building, a continued rise of water into the Amertap strainer pit would actuate 2 groups of 3 level switches. The actuation of any 2 switches within either group trips the circulating water pumps and initiates pump discharge valve and high pressure condenser discharge valve closure. The licensee used engineering judgment to determine that since the level switches are robustly mounted, no mitigation strategy needs to be developed.</p>
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Meetings.1 Exit Meeting

The inspectors presented the inspection results to Mr. Gatlin and other members of licensee management at the conclusion of the inspection on May 4, 2011. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

J. Archie, Senior Vice President, Nuclear Operations  
A. Barbee, Director, Nuclear Training  
L. Bennett, Manager, Plant Support Engineering  
L. Blue, Manager, Nuclear Training  
M. Browne, Manager, Quality Systems  
M. Coleman, Manager, Health Physics and Safety Services  
G. Douglass, Manager, Nuclear Protection Services  
M. Fowlkes, General Manager, Engineering Services  
D. Gatlin, Vice President, Nuclear Operations  
R. Haselden, General Manager, Organizational / Development Effectiveness  
R. Justice, Manager, Nuclear Operations  
G. Lippard, General Manager, Nuclear Plant Operations  
M. Harmon, Manager, Chemistry Services  
D. Shue, Manager, Maintenance Services  
W. Stuart, Manager, Design Engineering  
B. Thompson, Manager, Nuclear Licensing  
R. Williamson, Manager, Emergency Planning  
S. Zarandi, General Manager, Nuclear Support Services

## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

### 03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
OAP-100.6	Control Room Conduct and Control of Shift Activities	Rev. 2C
CR-11-01207	IER L1 11-1 Fukushima Daiichi Nuclear Station Fuel Damage Caused By Earthquake and Tsunami	
EOP-6.0	Loss of All ESF AC Power	Rev. 22
BDMG-2.0	RWST Makeup	Rev. 1A
BDMG-1.0	Spent Fuel Pool Makeup and Spray Strategies	Rev. 1A
SAMG	Scope, Training, User's Guide and Guidelines	Rev. 0D
PSEG-8.0	Technical Support Center Duties	Rev. 12
BDMG-5.0	Manually Depressurize SGS and Use Low Pressure Water Sources (Turbine Driven Emergency Feedwater Pump Not Available)	Rev. 1A
EP-100	Radiation Emergency Plan, Appendix C	Rev. 58
	V.C. Summer Nuclear Station Emergency Planning Telephone Directory	Rev. 103

### 03.02 Assess the licensee's capability to mitigate station blackout (SBO) conditions

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
EMP-100.002	Emergency Installation of Cables For RHR System	Rev. 6A
EMP-100.004	Installation of Temporary Alternate Feed Cable For Spent Fuel Pumps	Rev. 5A
EMP-100.006	Emergency Installation of Cables For SI Valves	Rev. 3A
EOP-6.0	Loss of All ESF AC Power	Rev. 22
EOP-6.1	Loss of All ESF AC Power Recovery Without SI Required	Rev. 14
EOP-6.2	Loss of All ESF AC Power Recovery With SI Required	Rev. 12
SOP-304	115kV/7.2kV Operations	Rev. 12E
AOP-304.1	Loss of Bus 1DA(1DB) With the Diesel not Available	Rev. 3G
AOP-304.1	Loss of Bus 1DA(1DB) With the Diesel not Available	Rev. 3G
CR-11-01599	NRC resident identified issues during NRC verification of CR-11-01207	



03.03 Assess the licensee's capability to mitigate internal and external flooding events required by station design

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
ECR 71238	Revision to Flood Calculations	Rev. 0
ES-0400	Service Water Pond Structure and Dam Inspections	Rev. 3
DC-03290-006	Determine Maximum Flood Level in Auxiliary Building and West Penetration Access Area	Rev. 0
DC-03690-005	Determine Maximum Flood Level in the Service Water Pump House	Rev. 0
CR-11-02380	Propagation of internal flooding through certain blast doors has not been postulated or evaluated in the internal flooding calculations	

03.04 Assess the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
UFSAR	Updated Final Safety Analysis Report	1/7/2011
FPER	Fire Protection Evaluation Report	6/8/2010
FEP-1.0	Fire Emergency Procedure Selection	Rev. 11B
FEP-2.0	Train A Plant Shutdown to Hot Standby Due to Fire	Rev. 4C
FEP-2.1	Train A Shutdown from Hot Standby to Cold Shutdown Due to Fire	Rev. 3G
FEP-3.0	Train A Plant Shutdown to Hot Standby Due to Fire	Rev. 4C
FEP-3.1	Train A Shutdown from Hot Standby to Cold Shutdown Due to Fire	Rev. 3G
FEP-4.0	Control Room Evacuation Due to Fire	Rev. 4E
FEP-4.1	Plant Shutdown from Hot Standby to Cold Shutdown Due to Fire in Control Building	Rev. 2F
FPP-022	Fire Prevention	Rev. 3
FPP-023	Fire Detection	Rev. 3A
FPP-025	Fire Containment	Rev. 4E
FPP-026	Fire/Hazmat Response	Rev. 2G
FPP-027	Safe Shutdown	Rev. 3A
PSEG-08	Technical Support Center Duties	Rev. 12
FPPs	Fire Protection Pre-Plans (for AB-374/385/388/397/412/463, CB-448/463, FHB-412/424/436/443/444/446/463, IB-412/436 and TB-412/436/463)	Various
EPP-013	Fire Emergency	Rev. 14D
OAP-100.6	Control Room Conduct and Control of Shift Activities	Rev. 2C

## **LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
AOP	Abnormal Operating Procedure
BDMG	Beyond Design Basis Mitigating Guidelines
CFR	Code of Federal Regulations
CR	Condition Report
EMP	Electrical Maintenance Procedure
EOP	Emergency Operating Procedure
EP	Emergency Plan
ESF	Engineered Safety Feature
FEP	Fire Emergency Procedure
FERC	Federal Energy Regulatory Commission
FIV	Feedwater Isolation Valves
IIR	Integrated Inspection Report
NRC	United States Nuclear Regulatory Commission
OAP	Operations Administrative Procedure
PARS	Public Availability Records System
PMP	Probable Maximum Precipitation
PSEG	Plant Support Engineer Guide
Rev.	Revision
RWST	Refueling Water Storage Tank
SAMG	Severe Accident Management Guideline
SBO	Station Blackout
SCE&G	South Carolina Electric & Gas
SOP	System Operating Procedure
TI	Temporary Instruction
TSC	Technical Support Center
USFAR	Updated Final Safety Analysis Report